



# NOTES PARVOVIRUS

## MICROBE OVERVIEW

### Genetic material

- Linear, non-segmented single-stranded DNA virus of Parvoviridae family

### Taxonomy

- Subfamilies
  - Parvovirinae: vertebrate viruses (mammals, birds)
  - Densovirinae: invertebrate viruses (arthropods)
- Genera
  - Erythroparvovirus, Dependoparvovirus, Protoparvovirus, Amdoparvovirus, Bocaparvovirus, Aveparvovirus, Copiparvovirus, Tetraparvovirus
- Parvoviruses isolated from humans
  - Adeno-associated parvovirus (Dependoparvovirus)
  - Human parvovirus B19 (Erythrovirus)

## PARVOVIRUS B19

[osms.it/parvovirus-b19](https://osms.it/parvovirus-b19)

### PATHOLOGY & CAUSES

- Primary parvovirus pathogen in humans

### Associated diseases

- Erythema infectiosum
  - AKA fifth disease/slapped cheek disease
  - 4–10 year old children at highest risk
  - Asymptomatic/mild
- Arthropathy/arthritis
  - More common in adults than children

### Structure

- Capsid
  - 2–4 proteins (VP1–4); icosahedral symmetry
- Non-enveloped; “naked” virus
- Smallest DNA animal virus
  - 18–28nm in diameter
- Genome size of 5000 nucleotides; encoding structural, nonstructural proteins

### Viral life cycle

- Viral DNA replication in erythroid progenitor cells
- RNA transcription, protein translation, virus capsid assembly in host cell nucleus
- Maturation → host cell lysis
- Acute infection impairs erythropoiesis

### Incubation period, infectivity

- Most contagious during active viral replication, shedding
- Viremia
  - 5–10 days after exposure, lasts five days; often asymptomatic/flu-like symptoms
- Signs/symptoms appear when antibodies produced, antigen-antibody immune complexes form; no longer infectious

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## CAUSES

### Respiratory transmission

- Most common person-to-person transmission
- Respiratory secretions, saliva; close person-to-person contact; fomites
- Stable in environment
- Commonly in **young children**, daycare workers

### Vertical transmission

- Infected individuals may transmit virus to fetus during pregnancy

### Hematogenous transmission

- Blood/blood products
- Individuals requiring regular blood transfusions at risk

## RISK FACTORS

- Young children, household members, daycare workers
- Pregnancy
- Immunocompromisation

## COMPLICATIONS

### Transient aplastic crisis

- Temporary suspension of erythropoiesis → anemia; ↑ red blood cell (RBC) destruction, ↓ RBC production
- Common in **sickle cell disease**, thalassemia
- Pallor, weakness, lethargy
- Rare
  - Congestive heart failure, cerebrovascular accidents, splenic sequestration

### Vertical fetal infection

- Fetus susceptible to anemia
- Nonimmune **hydrops fetalis**, neurodevelopmental impairment, intrauterine fetal death, miscarriage

### Chronic RBC aplasia in immunocompromised hosts

- Inability to mount immune response → hypoplasia/aplasia/erythroid cell line
- Severe acute/chronic anemia (potentially life-threatening)
- Lethargy, malaise

## SIGNS & SYMPTOMS

### Erythema infectiosum

- Mild febrile illness with rash
- Incubation period
  - 4–14 days after exposure
- Prodrome
  - Fever, headache, coryza, nausea, diarrhea, arthralgia, myalgia, malaise
- Classic facial erythematous malar rash with circumoral pallor “slapped cheek rash,” “glove and socks” palm, sole papular-purpuric rash; “lace-like” erythematous rash on trunk, extremities
  - Viremia resolved with onset of rash; 1–2 week incubation period
- Intense viremia associated with anemia

### Arthralgia/arthritis

- More common in adults than children
- Acute, often symmetric, small joints of hands, wrists, knees, feet
- Often develop rash



**Figure 88.1** An infant with slapped-cheek disease, caused by infection with parvovirus B19.

## DIAGNOSIS

### LAB RESULTS

#### Serological tests

- Atypical presentations, pregnant individuals exposed to parvovirus B19
- Positive parvovirus B19-specific IgM antibody, increased parvovirus B19 IgG titer
  - Parvovirus B19 IgM 7–10 days after virus exposure, measurable for 2–3 months
  - Parvovirus B19 IgG 2 weeks after infection, persists for life

#### Polymerase chain reaction (PCR)

- Detection of parvovirus B19 DNA

## TREATMENT

- **Erythema infectiosum**
  - Self-limited, mild

### MEDICATIONS

#### Arthralgia/arthritis

- Self-limited, no joint destruction; nonsteroidal anti-inflammatory drugs (NSAIDs) for symptomatic relief

#### Transient aplastic crisis

- Blood transfusion products

#### Chronic RBC aplasia

- Intravenous immunoglobulin (IVIG) for immunocompromised individuals

### OTHER INTERVENTIONS

#### Vertical transmission

- If mild anemia, well tolerated by fetus; self-resolving
- If severe anemia, intrauterine blood transfusion